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ECONOMIC AND INDUSTRIAL AFFAIRS

No. 2146

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CONTENTS

ENTREPRENEURSHIP IN SOCIALISM DISCUSSED

Budapest NEPSZAVA in Hungarian 8 May 81 p 3

[Interview with Tibor Kiska, director of the Hungarian Academy of Sciences and the Karl Marx University of Economics joint entrepreneurship-research team by Patricia Molnar: "Thoughts about Socialist Entrepreneurship"]

[Text] Nowadays the word "entrepreneurship," which has gained a new and broader meaning, is an everyday topic of conversation. It began--in practice--with the catering industry's contract types, competitive negotiations, and bidding therein, but these were preceded by a series of theoretical studies and debates. The studies and debates have not yet ended, since the contract type is just the embryo of the new economic creature that its originators christened "socialist entrepreneurship." What is the essence of socialist entrepreneurship? Is this new-born capable of living in the present economic climate? What kind of profile and what kind of sphere of activity can be envisioned for socialist entrepreneurship? These and similar questions served as the basis for a discussion which we had with Tibor Liska, director of a joint entrepreneurship-research team of the Hungarian Academy of Sciences and the Karl Marx University of Economics.

[Question] What is the essence of socialist entrepreneurship, and what is bringing it about; what makes it necessary?

[Answer] The basis of our recommendation is partly competition and partly the fact that within our socio-economic framework the management of social property is not something that can be granted, but it is a right: in fact, it is a duty of the entrepreneur. Entrepreneur competition always guarantees independent handling of social property to the most successful managers. Socialist entrepreneurship is competition. Bidding among managers determines what individual producers or service organizations will undertake or produce. In my opinion, every acute problem of our management, including insufficient entrepreneurship, can be traced back to the fact that today's "bosses" are no longer proprietors and not even personal stewards--managing in the spirit of entrepreneurship--of social property. Socialist entrepreneurship is not a step backward to the small holdership of private property that ties one to the soil, but it would go beyond state monopolization of property and dividing it up into "indivisibles." The basic principle of socialist entrepreneurship is to enable that person to cultivate the soil and manage the assets who will guarantee to manage it better than any other competitor and who will also provide for the most profitable growth of the social property for the long range.

[Question] Is there a possibility of this kind of competition under present conditions?

[Answer] I can say to that that it would be possible even in the present circumstances to operate in a more entrepreneurial manner. However, present conditions for competition and limited accomplishments are based on equalizing chances. Most of the more independent entrepreneurs who assume risks have at least one leg in the secondary economy. In my opinion present-day competition is like running a sack race--there is too much restriction. As an entrepreneurship-researcher, my task is to discover how to remove the sack. It has to be easier to run without a sack. Of course, this form of competition must be formulated so that it does not bring about unrestricted freedom or anarchy. In the end every freedom means a restriction of the freedom of others. Competition must be of the kind by which mutual restrictions of one upon another are reduced. Of course this cannot be found in libraries, at a desk, or through scientific debates: the hypotheses must be tested in practice and refined, if necessary.

[Question] Doesn't this kind of socialist entrepreneurship carry within it too great a risk? If I understand correctly, according to your concept the one who wins the competitive negotiation is the one who promises or undertakes the most...

[Answer] Look, there have been, are, and always will be sinners. But that does not give us the right to treat honest and honorable people as sinners. Certainly there will be some unsuccessful attempts under the system of socialist entrepreneurship, today there is a tendency to fear excessively adventurers and swindlers. It is not better to neglect through fear those reserves which could be gained by freeing up human entrepreneurship and individuals by. In my opinion, losses through ignorance and dishonesty will be negligible compared to the profit. As I already indicated, a new feature in socialist entrepreneurship is that one can compete not on the basis of being named or selected but on the basis of citizenship. The entrepreneurs are bidding for future incomes and expected results. Up to a realistic limit of risk, which can be increased to an optimum level, we should not look at where an entrepreneur has come from but where he is going. We can expect from adults--at least most of them--that they will not undertake impossible obligations. We can shift the principle of collateral from the past to the future.

[Question] What guarantee is there that the common property will not "go to the dogs" in this way? Perhaps controls will have to be increased?

[Answer] Just the opposite. The administrative controls and controls of controls that have taken over the world have monstrous costs. Let me make a comparison in this connection, a classic and, in my opinion, an excellent control system. A gypsy orchestra leader collects money for the music by passing around the hat with one hand while holding a live fly in the other. When he gets back to the orchestra, he releases the fly. The live fly is the guarantee that he did not cheat his partners while collecting; he did not touch the common money. But the leader doesn't have to hold a fly while playing a game or making music. In the economy, however--because of too much control--most people are forced to work with one hand, because in the other hand, even while working, they have to hold a "control fly." Personal incentive and competition on whether it is worthwhile to become involved in something or not are a much stronger master than administrative control. For this, of course, an

appropriate system of incentives are necessary. The possibility of bidding or the right to undertake [work] should be established; the right to bid, manage and develop an economic unit cannot be entailed. In fact, the essence of the system is that even the entrepreneur who has won a competition will "drop out" or be disqualified if another person arises who is better and more appropriate for the given activity. It must be in the interest of the entrepreneur to pass the "ball" of social property even to another "player" whom he himself has placed in a better position.

[Question] Within what kind of framework or profile is all this conceivable?

[Answer] Since I am not preparing my hypotheses for today or tomorrow but for a longer range, I have not considered frameworks and limits. Nevertheless I would emphasize that opinions are divided on selection of a profile. I think the sky is the limit--I think it is conceivable that the form of socialist entrepreneurship, bidding and competition, is applicable in any area. In such a way, of course, that in competition involving larger economic units, those areas that are most important for the national economy, the results achieved so far should be taken into consideration as a kind of collateral for capital. Just as everyone can play on the playground, but only those make the all-star or Olympic team who have previously achieved something. Because in the economy--as opposed to sports--not only participation but the outcome and winning are important... Finally, let me emphasize that we have [made] no judgments, and not just because we are at the beginning of our studies. We envision the form of socialist entrepreneurship in such a way that it will be capable of continual renovation, adaptation, and flexibility. Our method is debate, and our most important control is practice. Our concepts will only become reality if we create institutionally the conditions for concrete experiments--said Tibor Liska in conclusion.

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ACADEMICIAN REVIEWS PROSPECTS FOR TECHNICAL DEVELOPMENT

Budapest MUSZAKI ELET in Hungarian 4 May 81 pp 1, 3-5

[Article consisting of an abbreviated version of the central presentation, by Tibor Vamos, at a general meeting of the Hungarian Academy of Sciences]

[Text] Deviating from the custom I must begin this lecture not by exciting interest but rather by blunting it. Let us note that those who have come here are not receiving ideas in the form of recipes for the solution of our most serious difficulties; rather they are receiving solid advice--to continue the simile--regarding the pharmacal or culinary expertise required in anticipation of the unexpected sicknesses or guests of the coming period. Much of what is being said seems to be a commonplace which, on the one hand, is the result of a good state of affairs, namely that the domestic information level has improved, it is the result of the fact that a sort of social consensus in judging things develops rather quickly thanks to the freshness and many-sidedness of the information media. On the other hand, it is a bad sign too because a truth which has become a commonplace may be accepted at best as a conditioned reflex, as a collection of the things recognized yesterday. Treated as an established judgment, and thus a prejudice, it can be an obstacle to real analysis, to a recognition of changes and modifications.

A New Turn

We want to talk about these changes, starting from the basic ones--the modification of the technical conditions of production. We can see a new turn developing if we look forward to the next 10-20 years. We should avoid prophecy so we do not talk of hoped for great discoveries or scientific breakthroughs--we leave this to the writers of science fiction. We base our conclusions on things the sources of which can be felt very well in the laboratories, in experimental manufacture, even in the beginning of practical application. The new turn will come in two areas, difficult to distinguish from one another. The first is driven by electronics, the interdependent and transforming progress, affecting every activity, of information transfer, communications, computer technology, automation and organization. The other is the beginning of a new period of intensification forced by the new limits on energy, raw materials and markets.

I believe that we could with justice attach a third group consisting of the results to be expected in biological research--industrial branches working with new biological methods and agricultural processes. I hope there will be comment on this from

those experienced in this. I will try to comment only on the style of the sandal, like the shoemaker in the story. But I feel that the lessons to be derived from an analysis of this third group would only confirm what I have to say.

First of all, I would like to reawaken the interest blunted by my introduction. We must talk about these phenomena not because it has always been interesting to spy out how the rich got wealthy. We must do so because this turn promises a change in the position of our homeland in the world economic situation at least as great as that caused by the belatedly recognized earthquake of the early 1970's.

I can say more about the first group of phenomena, partly because it is close to me professionally and partly because the unfolding of it is clearer and less ambiguous. The rate of technical development in this direction can be indicated by a few figures: The transistor, carrying out a single logic function, appeared at the end of the 1940's; the first so-called integrated circuit, which contained several transistors, appeared in 1969. The frontier accomplishment of current technology is the "microprocessor" containing about 450,000 parts, with a processing capacity hardly less than the central unit of the largest computer in the country. By the end of the decade parts density may increase tenfold on the basis of laboratory results already achieved. The magnetic memory of the first domestic computer, in 1959, could store the information on about four typed pages and its operational speed was a few hundred operations per second. According to a resolution of the presidium of the Academy passed at about that time this computer would have been sufficient to satisfy domestic needs for years. The largest magnetic disk storage which can be purchased in Hungary today condenses the information from about 25,000 pages and a unit capable of storing 2.5 million typed pages will probably appear as a product on the international market this year. The current Academy computer handles 1.2 million operations per second; those faster than 5-20 million operations per second are regarded as large computers in the world today but this year they will market a computer with performance greater than 600 million operations per second and they are developing computers capable of a billion complex operations per second to recognize moving pictures and speech and for meteorological forecasting. Reliability has reached the point where the leading Japanese firm sets a standard of 4 years between breakdowns in a complicated special purpose computer for industrial numerical control. The change in prices has shown a similar dynamics.

Today, a computer capable of handling all data for a small factory or shop or a hospital department can be purchased in the developed industrial countries for one quarter the price of an average passenger automobile. According to a favorite simile of the popularizing literature, if the auto industry had progressed as much in the past 70 years as computer technology has one could buy a Rolls Royce for $20, its engine would be the size of a matchhead, its speed would be 100,000 kilometers per hour and it would consume 3 liters of gasoline per million kilometers.

The extraordinary modifying force of computer technology, information transfer and local and remote automation also appears in the fact that while everything in the world is getting more expensive--raw materials, energy and human labor--the price of the equipment connected with information transfer and processing is decreasing substantially in absolute figures, thus per system and per unit, while performance, as already shown, is increasing at an astounding rate.

The development of information channels, of information transfer, approaches that of computer technology. With the aid of artificial satellites and light conducting cables the broad band, extraordinarily swift digital transmission makes possible the united transmission of voice, picture, data and written text throughout the world, transmitting this information from anyplace to anyplace at a cheap price. Even Hungary is already member of a system with the aid of which one can make a confirmed reservation from any travel office in the world on any flight in the world without delay. There is no technical obstacle to extending this capability to any private household with a public telephone.

We are gradually linking up with international information, documentation and data systems; the time is not far off when all significant pictorial and written information produced and stored in the world will be available to everyone in easily attainable form as a telephone subscriber service. The network will have not only data, text and pictures but also and increasingly the so-called expert systems which offer the broadest possible information and computation, analysis and procedural experience in a special area in conversational form or in the form of a consultation, aiding medical diagnosis, research in new chemical materials, legal services, geological research and an ever expanding spectrum of intellectual activity.

The guidance of various activities and the acquisition and processing of related information will be modified radically. Even in our homeland already computerized measurement data processing is considered almost indispensable in larger industrial processes, but more objective computer measurement is also appearing for individual work machines, watching the deformation of cutting edges in machine tools and controlling the size, form, surface, color and other visible characteristics of products. Identifying shipments, controlling transportation systems, precise record keeping on the types of goods in commercial trade, their prices and the moment to moment stockpiles, thus the optimal overview of warehouse stocks, all take place with computers. There are more and more manufacturing units and shops in which every detail of the work process, thus the working machinery and the robot mechanisms replacing workpieces and tools, is controlled by computer technology devices. Manufacturing units equipped with such highly reliable guidance and control systems hardly need supervision and they try to develop them so that, preparing a second and third shift, production takes place 24 hours per day practically without human participation for the larger part of the day.

One of the pioneers in such an integrated manufacturing system controlled by computers is a Japanese machine factory which will be in production this year and will produce 500 machine tools and 350 new robots each month using robots and a total of 150 workers. The guidance of this equipment is prepared with computer aided planning systems so flexibly that the time for switching product types and the preparatory work will be reduced to a fraction of what was necessary before. In some cases the calculated modifications here are 10-20 times.

New, open, cooperative systems are taking the place of the former more closed, hierarchical systems. This means that the needs and the capacities are in the networks, a little like the already mentioned flight reservation system, and come into contact with one another more or less automatically, seeking the best form of cooperation at the moment. So a cooperative system offers a new, higher order and more human possibility in production, distribution and service.

With its greater flexibility and substantially more tenacious vitality the cooperative system demands much greater discipline and a higher level of culture than a hierarachy. We should think not of our traditional Mate Csaks but rather of Switzerland!

Thus the historically developed forms of international technical and economic cooperation are appearing in a qualitatively new way. The computerized network links have already made it possible for the employees of large multinational enterprises working on technical development to work on jobs together, even if on different continents, as if they were working in one room.

The magnitude of the change can be compared to that turn in biological development in the course of which the nerve cells formed in living organisms and the nervous system developed. The simile is a profound one. We will return to its significant content.

The other group of phenomena, as I have said, is more difficult to review and the various forms of its manifestation are difficult to foresee. We felt in the past decade for the first time and in a dramatic way the limitations on the use of energy and raw materials. The answers to be given to this by technical development are approaching the problems from many directions. Materials and structures with a longer life which can be planned for greater use are appearing; new or substantially modified technologies represent significant improvements in the energy needed to produce and operate structures. In addition the sharpening of market competition is increasing the quality requirements by leaps and bounds also. We all know this very well; but I would like to call your attention to this fact, that while conservation measures and major or minor improvements have a not to be underestimated role the chief movement of technical development points far beyond this and this is extraordinarily important for us in international competition: a new intensification process has begun in which results can be achieved only on the basis of the harmony of all the sharpened technical conditions. A number of the technologies introduced can be realized only with certain primary materials satisfying increased requirements and the requirements for the auxiliary materials used, paints, sealing and even packaging are changed. We are finding already what a serious effect the inadequate technical conditions harmony is having on our technical and commercial services. We know those extraordinary efforts with which the largest aircraft factories and other manufacturers of internal combustion engines are trying to reduce consumption, in some cases by 20-30 percent, to increase the life of equipment and reduce the noise level and environmental pollution. The manufacturing and working precision requirements in a number of areas, whether machine manufacture or micro-electronics, have shifted from several times 10 microns toward orders of magnitude under one micron.

We are well acquainted with the requirements in regard to the purity of primary materials, increasing by orders of magnitude, and the electrotechnological and structural requirements accompanying the perfection of the structure of crystals. In all probability the industries to be founded on the basis of the new achievements in biology will become part of this qualitative change. It is a datum characteristic of the quantitative and qualitative conversion that the fuel needed to produce a unit of national income shows ratio differences of 1:2 to 1:3 among the countries of Europe having nearly identical climates. In our homeland we use more than twice

the amount of steel and aluminum per unit of added value than, for example, in Austria, France or the United States. It can be taken as certain that in the decades ahead the deterioration in the energy and raw materials situation (at the least one cannot expect an improvement) will bring crucial technical changes on a broad front. We must constantly watch and evaluate these changes again and again because they are very contradictory. We have a good deal of data on how the number of enterprises competitive on the world market is decreasing in some branches of industry requiring special technical development and how the cost of the technical reconstruction needed for survival is increasing. On the other hand, we could cite many areas where a few firms had a monopoly of high technology earlier but now relatively small, dynamic enterprises have begun to compete with them because the basic technological equipment has become purchasable for practically everyone. This contradictory process cannot always be grouped according to branches of industry or technological processes; sometimes the picture changes very quickly. But the significance of technical preparation, of the speed with which projects are carried out and of the industrial infrastructure has not changed anywhere. And this is the most important lesson for us.

The two processes are interrelated; a general qualitative turn has begun in both the tools of work and in the organization thereof. This process is an amalgam of many types of scientific achievement, it is changeable and extraordinarily diverse in its effects, in forms of appearance and in its development in time, and so it demands from the technical and economic guides of our homeland a national technical policy which is always evaluating things afresh, which is most circumspect and which poses especially high intellectual demands.

We Can Only Choose to Go Forward

Every responsible government in the world has more or less recognized the challenges of this transformation and, approaching it from various sides, they are dealing not only with the consequences but also with the methods of meeting it. This last sentence brings us to our second finding. In our basic relationship to this turn we have no choices. We might say that Hungary cannot close its eyes, cannot conduct an ostrich policy in regard to the changes taking place in the world. It is perhaps strange that we must state this finding as a finding. But in the face of effects burdening us, which are certainly oppressive, it is natural to feel a certain antipathy which consciously or unconsciously does not accept this. One form of it is the romantic literary nostalgia which derives from the mood of society and which has accompanied all of human civilization. In brief: How much happier mankind was in the simple days gone by; let us not follow the vain new fashions but rather let us try to think out our own national, traditional, inward-turning, harmonious way of life. The other form of denial is more dangerous and not so beautiful. In essence it says that Hungary is incapable, in any way, of keeping up with international progress, it preaches practically complete surrender, a policy based exclusively on second and third hand license transfers, selling goods on an undemanding market, goods created with cheap Hungarian labor to serve second and third rate international consumption. This is a conservative attitude which, within the framework of a generally conceptionless defense, is inclined to take cognizance only with a serious delay even of the non-technological changes taking place in countries with developed technologies. So our position is sharp and determined: In the years ahead Hungary will find its place in the world not in the old competition situation but rather in a radically new one, with all the consequences thereof.

Unfortunately, the question before the country today is not whether we can improve our not exactly leading, mediocre position in the world rank list, but rather, can we even stay on this list, or will we be forced considerably down it. One's position on this list is not simply an ornament; it is a factor determining the value of our national income, the value of domestic work on the international market. So it is not in our power to arbitrarily select the way in which we are to go if we do not want to contribute irrevocably to increasing the backwardness of our thousand year history. We could experience in the years following 1971 the disadvantages caused by a belated and faint-hearted recognition of the changes taking place in the world.

I would like to make one other observation in connection with the place we occupy in the world rank list. Our economists pointed out even earlier that our position is increasingly disadvantageous from the viewpoint that we are under pressure from two directions; we are being pressured from above by the more developed countries and from below by those which are developing more vigorously. These developing countries--under much more favorable conditions that we--are trying to fill just those gaps which the above cited view would designate as the profile for Hungary, primarily physical and intellectual jobwork, production cooperation in industrial products which are less complex and require less technological preparation. But a new threat has appeared from the more intensively developing countries also--the social and structural levelling aspiration which would run counter to an increase in social tensions is not being realized in the developing countries choosing the nonsocialist path, what is developing is a pyramid or an iceberg the average of w[illegible] substantially below our average but the top part of which is becoming increasingly competitive with the present production level in Hungary. This involves not only the distant countries of the Far East, cited as well known examples, but [illegible] to an increasing degree India, where a stratum at least the size of France lives under rising conditions; and a few Arab countries could develop in this direction too, after social-historical birth pangs reminiscent of the Europe of earlier centuries they may unite a 2,000 year tradition of trade and handcraft with their oil incomes and appear as a new competitor on markets close to us. We can certainly say that the extraordinarily uneven internal development of these countries involves this possibility. Another aspect of the bilateral and multilateral pressure which is important for us is that in most areas of production the role of wage differences, primarily the role of wages which can be used by us, is decreasing more and more in economic competitiveness. We already find very many industrial areas where wages cannot compensate for a technological-productivity gap. The guidance of Japanese industry recognized this, among other things, when it started robot technology programs at a time when the wage level in Japan was below our own. In the developed industrial countries wages compensate for the installation of robots within one or two years; total profit is a good bit greater than this thanks to the absence of social and other employer burdens and the swifter and more precise machine service. At competitive prices forecast for the years ahead, using industrial robots costing 5,000-10,000 dollars, intelligent robots costing 10,000-20,000 dollars and other automation devices, the role of the wage fraction will decrease further at a great rate while that of the technical level and of manufacturing flexibility will increase by leaps and bounds. The danger is that every product of Hungarian industry, working at the present technical level or not modifying it substantially, will become noncompetitive simultaneously, in regard to technical level and the speed with which it can satisfy market demands and in regard to price.

Social Aspects

For the time being I will highlight two trends out of the social aspects interdependent with this forecast regarding the effects of technical development in the next one or two decades.

In essence, Marx already foresaw the first in 1858. I quote from his "Foundations for a Critique of Political Economics" (Karl Marx: "Foundations for a Critique of Political Economics" (rough draft), 1857-1858, Part II; Kossuth, Budapest, 1972, pp 168-170): "To the extent that large industry develops the creation of the real economy is less dependent on work time and the quantity of work used, less dependent on the power of those forces put in motion during the time of work... Rather, it is dependent... on the general status of science and on the progress of technology."

We have been witness to how the ratio of the agricultural population decreased to one fifth within half a century in countries with developed industries and a developed agriculture. Of course, the labor force thus freed did not migrate only into traditional industry; there also developed a powerful industrial, transportation, processing, educational, health and organizational infrastructure serving agriculture. A similar transformation is beginning in industry; as a result of the technological turn already outlined the number of those employed in immediate industrial production in the sense of today, indeed in the sense of yesterday, and their tasks can be expected to change to a similar degree. American estimates predict that by the end of the century only 7-10 percent of those employed will be employed directly in industrial production; certainly we will follow this more slowly. Structure will change so that the ratio of intellectual preparation and of service and support activities for users of products will increase, to perhaps several times the expenditure for direct production. It would be a serious error to hold back this progressive process by administrative means. Unfortunately the bureaucracy can imagine the struggle against bureaucratism only by bureaucratic means. Thus some of our incentives, still valid today, order engineers into places of work from which even the workers are slowly departing. The number of those not participating directly in production is decreased by administrative measures, which, in regard to the trends of industrial development, is about like concentrating on increasing the personnel in horse stables in the period of the mechanization of agriculture. The restratification of society, and all the sociological and politological consequences thereof, are just as unavoidable as were urbanization, motorization and the spread of television; our thinking must be directed not against it, but rather noting it and preparing for it. Let us again recall the example taken from phylogenesis, the relationship of the nervous system and other organs of the body!

What happened with the appearance of written records applies to our entire administrative structure--that was an age in which the official stratum was literate and the people largely illiterate. The development of informatics, of communications networks, of data banks and of information systems makes possible and necessary an administration which differs completely from what has gone before. On the one hand this is a requirement if we are to work competitively but on the other hand it is an opportunity to improve the quality of life, to develop socialist democracy and increase the attractiveness of our society.

In connection with informatics they have emphasized for too long a time those dangers which make possible the supervision of its citizens by a centralized, bureaucratic

state. Much less emphasis has been given to a contrary prospect, namely a broadening of the rights of citizens, turning state administration very largely into a real service activity, the much stronger decentralization which appears after the initial centralizing trend of computer technology. With the development of information systems embracing the country and the world the weights of centralization and decentralization are modified to such an extent that it is easy to imagine countries without a capital in the present sense and international, non-hierarchical cooperative systems of the type hoped for by the pioneers of socialism, systems without centers in the present sense.

All this is not the distant dream of futurologists or science fiction writers; it is a possibility within the next one or two decades, within three decades to its fullest extent, and beginning concrete preparations for it is today not so much timely as it is already late. We are very close to a state of affairs where the current provisions, regulations and decisions of state administration of interest in the affairs or daily lives of every citizen will be constantly available at any time on the screen of his television set. We can put an end to the several thousand year old mythic curtain system of an alienated state and of its officials and offices.

Thus the decisions and regulations will be accessible to and can be reviewed by everyone; it will be possible to precisely define those questions which, as it were, can be automated on the basis of simple judgment criteria available to everyone; investigation will not be required; trickery, influence and privilege will be strongly excluded; and it will be possible to define those decisions which require human judgment and behind which, as a result of this, the responsible person or body will appear in an immediate form and link. Just as socialist production and distribution can be really realized only at a high level of material production so informatics opens the possibility of socialist administration.

Production-social structure-organization-administration... thus we can come to a new synthesis.

What Can We Do?

So what can we do? Let us begin with a few negatives which may lead to things positive. It was never more true than today that we cannot given an answer to the future with a few ideas, a couple of inventions or products said to be promising. The complex interdependence and constant change of conditions argues against aspiring to any monoculture. In many aspects we are contradicting here the popular slogan of selectivity interpreted as applying to simple products, a slogan which never has been carried out and which never could be carried out. But, as I said in the introduction, it is probably not necessary for us to select the recipes in advance; we only indicate the nature of the kitchen. A monoculture is not a culture; in many respects it is an articulture and an increased vulnerability. We might cite the sad examples of economies dependent on sugar, copper, butter or even steel or watches. Innovation, a flexible market response, is the result of very complex components and decision processes. And we must see that in the area of technical development we are in general not capable of realizing the entire vertical chain of innovation; a number of our basic research ideas and achievements are such that it is almost impossible to develop them, manufacture them and make them marketable in Hungary alone. At the same time we cannot give up having basic, marketable work in every

area which is essential from the viewpoint of the Hungarian future so that we should be, over the long run, at home even on the international market. The new arises from many sorts of threads coming from many directions in a decision and action system of many steps. We must see that the hope of simply cutting the Gordian knot is played out. As an example I might mention the innovation practice of the largest, completely vertical trusts. Management practically never defines the basic research goals and they are not made a function of market demands. Management approves the research frameworks and directions and sees that talented, creative people work with them. Development grows out of existing basic research achievements; they fit them into their plans if they find them sufficiently ripe to ensure industrial execution and economic and technological competitiveness. Naturally, in the course of developmental work ideas and problems come up for basic research but this character of development, deliberately based on internal trends and processes--what we might call its openness--is the crucial strategic line. A more serious development may be started according to plan, but always along several parallel paths. Starting manufacture, preparing for manufacture, putting it on the market is the result of selection from among a number of developmental achievements. I have tried to describe this process in some detail so that you can see that the time of methods precisely laying out a chain of deterministic and planned events is long past; one should not nourish an illusion of such a thing.

One aspect of this is that, being a small country, we may have to play the role of a highly skilled artisan within international cooperation. This will involve exploiting our other favorable qualities, the chief example being our agriculture, but I might list profits deriving from a few treasures of the domestic land or from proven traditions of domestic industry. Of course, by artisan I do not mean home workshops but rather the role of the division of labor. We must constantly strive to fill those gaps which the giants of international cooperative leave empty, nimbly adapting to the changes therein and to the various special demands of consumption. This always was and it remains the possible arena for undertakings with little capital. Closely related to this and to what was said before is the fact that qualitative development is the only path for us within this arena. Representatives of every profession could list those firms, generally not large but playing a significant role on the international market, which manufacture special instruments or equipment, provide services, and have their strength in their level of quality. With their special services and strong research backgrounds these relatively small enterprises are rather stable even today. In a manner similar to the demand for a changing variety of goods, which increases parallel with the rising standard of living, there will be a strongly increasing demand for products offering changing, special services. One aspect of this is the proliferation of various software houses, organizational institutes and engineering enterprises. Such smaller, more flexible organizations live in an almost natural symbiosis with the big organizations, supplementing them, but always preparing for those quickly changing opportunities which come from the technological movement of the big operations. As a result of modern production methods the proportion of intellectual work in these tasks is becoming increasingly predominant. In computer technology, among developed users, it is already rather general that the value of the equipment, of the hardware, is one tenth that of the organizing planning and programming work to make the system work, of the intellectual work supporting modifications and operations, of the software.

In the plan which has now begun our industrial strategy has started in this direction, if belatedly and still uncertainly. We are investing our more restricted assets in the pharmaceutical industry, in the primary materials industry for it and in the fine chemicals industry; we are trying to strengthen the signal technology industry, which got into a dangerous situation, with modern parts and systems technology bases; we have made a start toward modernizing the fine food industry. Naturally, this chief trend and strategy does not mean that we will not progress further in those proven areas in which we have invested great energy and money thus far and which prove to be well founded in the future. But what will be characteristic here also will be changing step, for example, toward quality steels and special orders in the steel industry.

The initial capitalist export successes of the machine tool industry depended on this recognition also, the switch to the most modern computerized machine tool control and the associated equipment. Swift progress here is a critical requirement; what is involved is the industry which manufactures the tools of production, thus the industry which prepares the future. One of our most successful large undertakings, autobus manufacture, is striving to accommodate to a very flexible demand, orders for perhaps only 10-20 autobuses, in the place of the present, essentially homogeneous, single type production. A correct direction has been designated and some praiseworthy steps have been taken but we cannot deny that even here we suffered a series of losses, where we had the objective conditions for success, because of slow and inconsistent conversions and execution weak in intellectual and leadership courage. Sticking to areas which I know, I might list the possibilities of the semiconductor industry a decade ago, our development, the first in the world, in machine tool control, the graphic displays and the automatic measuring instruments of the electronic industry.

Caution in regard to monoculture might be voiced not only in regard to products but also in regard to the character of production. It has become clear in our electronic industry that the earlier conception, according to which we should manufacture modern products from imported parts and export them, was not feasible exclusively and in itself. The complexity of the incidental conditions made it absolutely necessary to begin to recreate a parts industry many times more expensive than the assembly industry. But this parts industry cannot attempt to reproduce, 3 years late, the many small parts which can be obtained on the world market for pennies.

The combination of socialist cooperation and the capitalist competition markets aids to a great degree the chances of Hungary. We still have today ample opportunities in the cooperation of the socialist countries to sell relatively large quantities of products with relatively long variety stability; under present conditions this aids more advantageous price formation on the capitalist competition markets and, with a secure background, it gives us greater flexibility.

A Few Conditions

So the chief condition to maintain our present relative level is a swift qualitative turn. Our economists have been urging for years, correctly and in a convincing way, an increase in the adaptivity of the country. This has become the authorized position in the development of our economic guidance, one which has already brought results, in contrast to the earlier rigid, voluntarist planning and guidance ideals.

There is no doubt that this strategy is not an incantation promising simple solutions. We know that the other nations are watching the world changes too, many of them are drawing similar conclusions and have already started in these directions, and with more favorable antecedents than we.

We could not have taken this path without a many times more lively, more adaptive ordering of internal and international factors, without changing movement. Still, we consider it feasible because much more depends on our internal behavior than depends on our other conditions.

This internal behavior excludes a passive observation of processes or the development of economic regulation directed only and exclusively at goals considered most important at the moment. Preparing for new conditions for a period of several decades is a thing which goes far beyond the time or action horizon of enterprise management; the stakes here are the problem of guiding the future of a nation, its investment and its risk. I would emphasize a few of the tasks of preparation which I feel should be mentioned here and from this forum from the viewpoint of the future of technical progress, from the viewpoint of the Academy.

Our chief national value with which we can prepare for the historical test of the period recently begun is a swift increase of creativity. It is in this respect that we have committed the errors which will probably have the longest lasting effects. A system struggling with a poverty of resources is forced to consume its reserves, but in the next period this causes damage requiring a much greater investment and a much longer time to restore. We experienced this earlier in the area of the infrastructure, paying many times over for the earlier economic policy which underestimated its significance and exploited it. The debt of the coming decades in regard to the present derives from the devaluation of creative intellectual work. It is very difficult to say today, under circumstances in which we cannot count on a general and real increase in the standard of living for years, that there is a state of affairs accompanied by intolerable and unbearable consequences in which the income of the stratum primarily responsible for the level of production has fallen below that of the least qualified, and that an end has been put to those economic and social prestige incentives which attracted people to careers which create new and constantly to be renewed production. In Hungary today there are fewer and fewer truly prepared and talented designers and technologists. Designing and working out the technology for modern products which bring into harmony the complexity of all technical conditions, esthetic appearance and utility and level of use is a basic condition for a flexible response.

In recent years one could get into the Mechanical Engineering School of the Budapest Technical University with 13 points and for years the Miskolc University has hardly been able to meet its quota. After leaving the universities even the more talented engineers generally get into circumstances in the plants which do not encourage creativity but rather encourage them to work as shop workers or administrators in order to save enough energy for their free time so they can make a living. I do not emphasize design and technology, as the most beautiful of all the engineering sciences, by chance; the ideal of the truly great engineers is Leonardo da Vinci, because only the greatest talents have been capable of imagining the proper arrangement of structures moving in space, the modification of relationships among them, their behavior under differing conditions and the possibilities for producing them. The computer aided planning methods of today cannot replace human creativity; indeed,

in a truly developed production system the tasks which can really be mechanized can be taken from human shoulders only to the extent that all energy can be concentrated on creative activity. A new type of approach, new intellectual foundations are needed for these new possibilities of the man-machine symbiosis. The entire society, and within society the stratum that designs the material mechanism which makes society work, must be prepared for this task. So we must think about the directions and methods of preparing for the new situation, about incentives, about the future experts structure of technical development and industry and about the principles of selection.

It is probable that creativity, like all other human faculties, has substantial periods of imprinting; thus there are times of life in which this function must get its start or it will never develop later. Experience suggests that the period in which creativity really gets started can be put between 15 and 25 years of age. In our engineering practice we generally find that he who has not become a truly creative person, capable of formulating the new, by this time will never be so, at most he will be a diligent, good student, a good continuer of the old. But if the start comes in time and with a good foundation and if one can develop further on a soil which generates success then engineering creativity can be maintained through 3-4 decades.

With the extension of university training to the age of 25 years and with our present training methods it appears that we are proceeding in the opposite direction.

The coming generation must live in the often mentioned man-machine symbiosis and thus communication with computers will have a role like that of literacy in an earlier age; it will also be a characteristic of and a condition for the future economic progress of the populace. In a number of developed industrial countries they are working out government programs on how to teach coexistence with computers and informatics even in the lower schools and on how to make this more accessible to the older generations too. We can only applaud the attempt to educate a broad receptivity, providing general culture, in the place of the earlier inflexible, pseudopractical training which forced general culture into the background and narrowed horizons.

The representatives of the technical sciences must themselves voice the opinion that uniting classical culture, an awareness of human and national identity, recognition of historical processes as a process and an understanding of the development and symbol systems of the special features of various strata and nations with the basic culture of pure mathematics and the natural sciences will lead to much greater results in any profession than simply learning by heart the timely, concrete special information which will become obsolete in a few years.

Many analyses deal with the question of how automation shifts the structure of the labor force in the direction of higher or lower training. Experience really does suggest contradictory signs depending on the various levels of maturity. But the lasting effect certainly is to raise the level of training of the labor force; a detailed analysis, naturally, is an especially responsible task for us. We must examine, however, the dimensions of the various training levels of the technical intelligentsia; the ambition (not always the result) of current technical university training is a high level leading stratum. It will probably be necessary to increase

the demands in this regard and the number involved will probably have to be limited because of the limits of talent. But in addition to this leading stratum, creating the new, society needs a broad, well trained upper and middle level cadre, probably much larger than today, but trained a good bit more cheaply and in a shorter time than is being done by the technical universities.

In the spirit of increasing adaptivity and turning toward quality we must restore rank to and the material and moral respect for quality, and outstanding quality therein. The demand for creativity must begin with the leadership. In addition to the economic regulators the chief tool the state leadership has to make a leap toward quality is a radical improvement in the selection criteria for the upper industrial leaders appointed by the state. Usually leaders try to select downward in their own image. Enterprising, cultured, creative leaders who know foreign languages will probably surround themselves with similar people. The triple requirement of leadership has changed in content in the past quarter century; in the period of the struggle for power the tests of socialist commitment were different than they are today. Three decades ago the question of power was more important for us than anything else and with this we lay hold of the economy; today the question of the economy has become the priority question for us and this is a condition for our power as well. It follows from this essential change, a change reflecting the achievements of the path we have followed thus far, that today profit does not depend on the relationship of the enterprise leaders to power but the other way around, state and social power will strengthen depending on profit and this strengthening must be enterprise by enterprise.

Those who select the leading ugard of industry and technical development bear an historical responsibility for the future of the country.

It is perhaps clear from what has been said that this change in the content of the requirements system tends not toward technocracy but rather toward a richer socialist culture, toward richer personalities, not an accommodation to appearances but rather an accommodation to the present and future realities. This reality is hard and unmerciful; it may require greater changes, having a mroe serious effect on human fates and groups, than our greatest undertaking heretofore, the reorganization of agriculture; it does not demand individual outstanding leaders but rather an interdependent order of battle of leaders, incentives which will make talented people undertake the leadership of industrial economic and technical development, instead of places on the social periphery which seem secure, and the development around this leadership of democratic controls for further selection.

We have not yet drawn for industry the lessons of the qualitative change which took place in the leadership of agricultural operations. We do not have methods or organizational forms for the selection of leaders, for taking into consideration and cultivating talent, imagination, initative, responsibility, working ability, internal discipline and the professional and general culture indispensable for leadership; we do not have methods for employing and assigning people destined for leadership. So we have a lot to do.

In the interest of encouraging talent and turning toward quality we do not recommend that there be a general pay adjustment for all technical intellectuals playing a crucial role in production. This would be impossible now anyway. But we do consider

it necessary that, going beyond the voicing of slogans, we really put an end to the levelling of organizations showing outstanding results and the colorless averaging within organizations, making it possible for the outstanding people in organizations with outstanding achievements to derive at least as much personal profit from their achievements as the incentives have made possible already in the area of services in short supply. And we must see to it that the methods for this serve the long-range profit of society.

We have noted several times that Hungary can have a role in international technical progress only in accordance with its size and possibilities. I would refer to two groups of questions in connection with this. One is the relationship between our own technical progress and imported information.

International Cooperation--Domestic Background

Licenses and information imported in other ways are as vitally important as foreign trade, not only on our scale but also for the leading industrial countries. Even the simplest import of goods involves the import of some information; new materials, designs and methods of processing come in even with consumer goods. So the question is not whether or not we will participate in international technical progress by means of this important tool; rather, the question is whether we do this like a tribal chief buying glass beads for slaves or do it in the Japanese way, that is, whether we buy product licenses containing a large import ratio, licenses already outmoded abroad, without our own background or policy for reception and further development or do we buy primarily technological licenses or licenses involving technology which will increase domestic technical progress, licenses which we can develop further either jointly or on our own. Although licenses pertaining to products can be very profitable in the processing industry, especially if they quickly make up for some shortage and do not require the import of expensive primary materials and technology, the emphasis must be placed on technological development.

The solution is not to re-bureaucratize the purchase of licenses but rather, once again and always, cultured, creative industrial leadership striving for enterprise and national economic achievements.

We cannot remain silent about the question of the much mentioned technological gap. It would be stupid to deny the existence of the gap; we know the serious historical reasons for it. It is customary to analyze whether the gap has decreased or increased in the past 10 years and what can be expected for the coming period. The directions of both the increase and the decrease are instructive and it is especially important for us that we be able to give some sort of estimate of the possibilities before us. It would be difficult for us to speak of a general decrease in the gap; this would contradict the well known facts. At the same time, we should not forget that the gap differs characteristically in different areas, and in a very noteworthy way even within these areas. I can say something about computer technology, an area I watch more closely. The gap has not increased; indeed, in some cases it may have decreased in all those details where large scale, concentrated efforts could be made or at least started, for example in the creation of central units and the production of a few microprocessor types. But the gap has increased, or at least not decreased, in those tasks which require special precision engineering technology or large scale, well coordinated planning and an improvement in

services. This includes, for example, the production of software, the commodity character of which (that is, finding and teaching ways which can be used by the consumer, maintenance, further development, treating it as a service) was for a long time difficult to explain in contrast to the conception which treated it as a sort of mathematical task. It would be a mistake to measure this gap in a simple time dimension, in years; this procedure would give misleading results in both positive and negative directions, would ignore the real interdependencies, the good and the bad differences, and would simplify unacceptably a complex problem which should be approached from many sides. The existence and characteristics of the gap are increasingly recognized and studied in the other socialist countries also. We can see in many places the development of economic policy, organizational, educational and conceptual diagnoses and recommendations similar to our own, some of them substantially anticipating the development of domestic awareness. Partial changes can bring partial results. We muat pay attention to these. Naturally one cannot foresee in the individual socialist countries, after the minor improvements, the time between a recognition of the change which has taken place in relationships and the initiation of the changes needed, but it is necessary that they will come. This may be a little bad for us but it could be very good for us because it will demand at least as much flexibility in changing our attitudes and in our methods thus far for playing a role on the socialist market as the change which took place on the capitalist market in the 1970's. Until then we must progress steadily by constantly paying attention to realities and constantly correcting our earlier views. This requirement, demanding a flexible strategy, is all the most important because the waves of the international political situation will seriously influence the opening of and the limits on our possibilities.

Keeping within the bounds of a general meeting of the Academy we must still talk about what the Academy has done and what it can do in this nation testing task. It is hardly possible to overestimate the merits of our economists and sociologists who felt out in good time the directions of the changes, dared to point out the slogans which had lost their validity and worked out proposals which united research and participation in practical action with a long and difficult campaign of persuasion and explanation. The country can be proud of these intellectual centers and, in its own interest, it should protect the free research and opinion forming work of them.

We met our obligations in industry also. We regarded as our task not the satisfaction of daily orders but rather foresight for the country, mastering the new, selecting and spreading the useful and working out results which can make it truly competitive, which do not so much preserve the backwardness but rather strengthen our negotiating position with friend and adversary.

In closing I would like to say something which appears to contradict everything which I have said above in connection with preparing for changes and increasing adaptivity. It does not contradict the observations made on school education. Such a technological, social-organizational and sociological change-over cannot take place without shocks, if we do not have constantly preserved values, if the country does not have an awareness of national identity, if society does not have faith in the development of socialism, in its ability to go beyond obsolete forms and slogans which have lost their content, if there is not something positive and foward looking to say, if there is not a stable order of values in regard to activities especially useful to society, in the status of individuals and organizations, if there is not a pride in one's craft in the good sense.

The challenges of the much cited turning also include the fact that the awareness of a nation must be filled with new content while preserving the old and what is positive in direction. This task will demand imagination, courage and profoundly sound foundations.

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EXPANSION OF AGRICULTURAL PRODUCTION SYSTEMS

Budapest MAGYAR MEZOGAZDASAG in Hungarian No 20, 20 May 81 pp 3-4

[Article by Jeno Hecsei deputy department head, and Gabor Boda chief official, of the MEM (Ministry of Agriculture and Food Industry): "Medium Range Development Program of the [Agricultural] Production Systems, Part I]

[Text] There are now 72 production systems operating in agriculture, 21 of them are in charge of organizing plow-field crop growing, 30 in horticulture and 21 in livestock raising.

The use of production systems expanded quickly during the Fifth Five-Year Plan--primarily in the extensive direction. As a result of this, production is conducted with systems technology on 74 percent of the wheat area, 84.5 percent of the large-scale corn production area, 83 percent of sunflower area, 74 percent of sugar beet area, and the total area of rice. Large operations use systems technology on 40.3 percent of the grape area and on 38.9 percent of the fruit orchards. Systems technology is used in livestock raising 53.6 percent of the large scale cattle raising enterprises, and by 69.7 percent of those raising hogs are produced with the professional guidance of production system organizers.

It can be seen from this that the use of production systems, and the activity of system organizers fill important roles in improving agricultural production, and for attaining the planned goals. Therefore, when the foundations for the Sixth Five-Year Plan were being laid, the production systems also prepared programs to improve the production of their partners, and coordinated these [programs] with the central organs.

We will next review the main characteristics of the Sixth Five-Year Plan's development programs, and some of the problems which occurred. We are doing this to enable the finalization of the plans which is now taking place to provide a good foundation for developing the relationship of common interests between the system organizers and their partners.

The technology application area of the 12 crop production systems recognized by the state and the 10 recognized previously have together surpassed 2.2 million hectares. The crop-pairing activities of the individual system organizers increased vigorously, the result of which is that all crops grown on plowlands appear as member crops of some system.

Most of their development programs are well thought out, multifaceted, and serve the interest of the partners. It can be generally concluded that:

--the vigorous growth of the land area of crops included in the systems (by 44 to 45 percent in 4 to 5 years, to a total of 3.2 million hectares) indicates primarily that the given crop's total production area is included in the system in the existing partner farms, and that crop pairing is being further broadened, rather than that new partners are being enrolled;

--the purchasing opportunities and the primary role of profitability were not always taken into consideration in the material and technological supply to production, thus the planned yields are unrealistically high and not always can be supported by the expected system of conditions.

Development Programs: by Crop

For spiked grains our goal is 1,215,000 hectares of sowed land. This means that practically the entire growing area will be included in systems. In comparison to the average of the years 1974 through 1978 inclusive, a 13 percent yield increase is planned in 5 years. This can be considered a realistic goal. The planned type ratios follow the central guidelines on type policy. By the end of the plan period the domestic types are expected to again dominate. The efforts aimed at rationalizing the use of energy and expenditures must be supported in grain production. Within this support must be given to developing the justified and possible ratios of tilling the soil with and without turning over the top layer, and to applying various agrotechnologies adapted for the production location.

In corn production the system organizers aim to increase growth area primarily by including the corn of large farms in the systems. Further area expansion in addition to this requires coordination of the system organizers. The planned, approximately 15 percent growth of the overall yield appears to be a bit excessive, especially if we also consider the system of production conditions. Even though the biological foundations potentially make average yields of 10 to 14 tons per hectare possible, but these have to be exploited more than before. The system organizers plan to shape the internal system of conditions for production organization and implementation (technological development, giving professional advice, agronomical services) in accordance with the above outlined very high task.

In sunflower production the dynamic growth of acreage will continue, and it surpasses the industrial plan projection. This is supported primarily by reasons of profitability, but examining the location of the land it can also be concluded that its ratio is being increased also on the better quality production areas. Under the present set of possibilities the upper limit of contractual production in systems is 230,000 hectares. Yields will increase by about 15 percent during the plan's time period according to the programs; the foundation for this is created by further popularization of the hybrids, as well as improvement of the agrotechnical factors. However, the fact that we have no type which is resistant to the diseases of the flow head and of the stalk, and we do not expect to have

such a type in the near future, does cause a problem. The production systems with larger areas are planning in their development programs to independently produce their own seeds. However, at this time only the Bacs Imas AG [State Farm] (BNR) has received authority from the MEM to do this. But reasonable distribution of the work is imaginable on the nationwide basis within the framework of coordinated seed propagation. This work is now in progress.

In rape and oil flax production the organizers of systems have made plans to significantly increase the planting area, while crop yield will be increased by about 30 to 40 percent. But all this appears to be questionable from the viewpoint of agrotechnical foundations.

Soya production continues to be implemented overwhelmingly within the framework of systems, and the growth plans exceed the national economic plan with respect to planting area and yield.

In sugar beet production the production systems continue to occupy an important place. Steady increase in the world market price justifies stabilization of the domestic sugar beet acreage and continued increase of the acreage enrolled in the systems. Technological conditions will have to be created for implementing the acreage projections. Under such circumstances the yield averages can be realistically increased to 42 tons, considering the good domestic types (their ratio is 90 percent).

In potato production the use of systems is prevailing again, with the appropriate organizational, regional and technological distinctions (KITE [Corn and Industrial Crop Growing Cooperation (located at Nadudvar)], Szentlorinc, Somogy). The planned yield increase is moderate, and with reasonable frugality with materials, equipment and energy the income position of the branch can also be improved. Rapid gain in the popularity of the domestic types, and vertical expansion of production (food industry) can also help with all this.

The system acreage of tobacco growing can be considered to be in its final form. However, yield projections can be met only with more favorable type selection than the present one, and with average weather. There is no opportunity to modify the numerous factors hindering progress, thus production during the plan's time period is quite uncertain.

The processing industrial enterprises continue to handle the organization of fibrous plant (hemp and flax) production. The size of the acreage and the technology which can thus be used more efficiently make it possible to produce the planned quantity with good quality. In the case of fibrous flax the seed import is adjusted to the demand, while organization of the production of hemp seed will become reality by the middle of the plan period.

Organizing the production of fibrous and bulk fodders in systems is one of the most important tasks of the Sixth Five Year Plan since it has been proven that the use of production systems results in very dynamic growth. Thus significant progress can be expected if silage corn, alfalfa and sod [grass] are organized in systems. The sod development program of IKR [Industry-type Corn Production

System] must be emphasized separately, during the implementation of which they want to achieve hay production averaging 10 tons per hectare on 92,000 hectares.

Table 1. The Sixth Five-Year Plan of the Production Systems

Plant	Acreage in the systems (1,000 hectares)	Percentage of the total planting area
Wheat	1,215	93
Autumn barley	48	37
Spring barley	40	29
Corn	974	78
Rice	25	100
Sugar beet	104	90
Sunflower	263	88
Rape	39	43
Oil flax	2	100
Soya	27	90
Lupine	128	100
Pea	34	57
Hemp	5	63
Fibrous flax	4	80
Potatoes	10	13
Tobacco	6	46
Silage corn	69	26
Alfalfa	141	39
Alfalfa seed	14	28
Red clover seed	14	70
Fodder sorghum	28	56
Total:	3,180	68
Sod	285	22

The growth-oriented work of the organizers of production systems working in small seed production is very important as this is indispensible in fibrous fodder production. The 128,000 hectare lupine program deserves particular attention both from the profitability and from the growing technology viewpoints.

With Coordinated Goals

As we have shown, the system organizers are deviating from the plan's goals in the area of increasing production in some branches, primarily in the production

of sunflower and soya. Problems may also occur in tobacco and sugar beet production if conditions change in an unfavorable direction.

The system organizers are taking greater care than before to improve the technical aspects of production. They made it a goal for themselves to make some large technical improvements which must be supported in a centrally coordinated way in the interest of increasing the leading role of the production systems and modernizing their technology. (Primarily in the areas of energy efficient soil work, harvesting and storage.) In the interest of creating the financial conditions needed to do this we consider it absolutely justified to allow those system organizers who form a technical development fund on the basis of their basic activity, to spend it as their own private resources for the implementation of the above-mentioned tasks.

The production improvement programs deal separately with the questions of further development of the organization's interest system, and of the economic and informational work. In spite of the fact that we do not consider it justified to increase the number of production systems in the near future, it is necessary to moderate implementation of the parallel activities and qualification of the production systems can be considered as the main tool for this [sic]. Besides this efforts must be made for more vigorous implementation of efficiency, growing strength, and organizing activity which conforms to the needs of the partner farms.

The system organizers have recognized the need in their improvement ideas for organizational background in the associations. In our judgment these organizations create objective opportunities for the formation of service circles and for meeting the needs of the partners by establishing joint development funds. In addition to this it would be justified also to take increased advantage of the possibility of forming independent credit connections.

More Successful Economic Work is Needed

In most production systems the developed interest systems even now conforms to the particular tasks. Sharing in the extra income has become general practice and the prepared programs are also taking into consideration the broader introduction of sharing in the profits (or in the budgetary sums).

With the exception of the larger system organizers the work of economic analysis falls short of the demands of their members and also falls short of the modernness of system technologies. A small improvement in this could result not only in that attitude becoming dominant which emphasizes profitability of production, but also in increased income. Unfortunately only a few systems conduct cost-benefit studies and implement technological improvements based on it. Therefore it is absolutely necessary to expand this activity during the plan period, in addition to creating the professional and technical backgrounds.

The system technologies and the improvement programs appear to be well founded from the human side both from the viewpoint of dispensing professional advice and from the readiness of the partners to receive the same. The personnel

staff of the system centers can be considered to have [fully] developed but it will continue to be necessary to increase the numbers of professional consultants possessing the proper experience, professional training and managerial attitude.

In the area of plowland crop production the improvement programs of the system organizers, in our judgment, sufficiently support the central development ideas related to agriculture's growth. We therefore consider it absolutely necessary for them to also coordinate their goals with the megye organs, and also [we consider it absolutely necessary] that the regional as well as the central organs should rely more on their organizing and production improving activities than before. (In our next article we will report on improving the livestock raising and horticultural production systems.)

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MINISTER OUTLINES TASKS, PROBLEMS OF AGRICULTURE

Budapest MAGYAR MEZOGAZDASAG in Hungarian No 20, 20 May 81 p 5

[Article by reporter Feher, based on statement made in the Parliament to the press by Jeno Vancsa, minister of MEM (Ministry of Agriculture and Food Industry): "Modern Requirements--Tasks Requiring Renewal"]

[Text] Minister Jeno Vancsa gave a report in Parliament to the press about the situation and tasks of agricultural production. After the welcoming words by state secretary Zsolt Bajnok, chairman of the Information Office of the Council of Ministers, first the international economic changes were discussed which also very unfavorably affect the [Hungarian] agriculture. The minister related that while in 1972 one ton of petroleum was worth 124 kg of corn or 17 kg of raw meat on the dollar market, for the same thing one had to pay with 1,440 kg of corn or 150 kg of raw meat in 1980.

In spite of our increasing difficulties, in the Fifth Five-Year Plan the agricultural branches provided more than one-fourth of the national economy's gross production, and one-fifth of its net production. Food makes up 22 to 26 percent of the total export and one-third of the dollar-accounted export. Food exports increased by 23 percent, and 60 percent of our foreign trade balance. The dollar-accounted balance is twice that of the 1975 value.

The domestic supply is well balanced, and varied; food and luxury items make up 45 percent of the population's consumption. In 1980 per capita grain production approached 1,300 kg, and meat production [approached] 150 kg.

High level forums here at home and abroad have recognized the work of those in food production for these results; their activity is surrounded by a favorable political atmosphere and social recognition, which are important foundations and incentives for their future work--said Jeno Vancsa.

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How high is the level of our agriculture which measured by international standards? Comparing our results with the international ones, we see that the rate of production's growth has kept up with those of the developed agricultural countries. But our ranking has not changed: we are in 8th to 10th place in

Europe. That is in the last 5 years we failed to make any gains in the ranks as a developed agricultural country; we merely held our place.

During the years of the Fifth Five-Year Plan agricultural operations spent 124 billion forints, and the food industry spent 52 billion forints on investments, expansion of their production capacities, and modernization. These resources at the same time also served to lay the foundations for the Sixth Five-Year Plan which began this year.

Our agricultural policy is also counting on the production of the household plot operations over the long range. And the fact that the small producers, the household plot operators continue to increase their equipment inventories, proves that they also see possibilities in production: in 5 years they have taken out loans totaling 6 billion forints, and in addition to this they have, of course, also contributed some of their own financial resources to increasing and modernizing their facilities, equipment and livestock.

There are several negative aspects, or weak points in the branch's activity which must be corrected urgently. The first among these problems is that contribution of agricultural production to the national income falls short of the necessary level. The growth rate of net production is low. Financial expenditures have been increasing at a higher rate than reflected by the yields. Profitability, competitiveness and the quality improvement work have not kept up sufficiently with production growth.

Significant differences exist between regions, operations, or even individual production branches. The circle of producers has further differentiated. This cannot always be explained by natural circumstances and differences in soil quality. Unfortunately, some operations are really working under unfavorable circumstances. However, many of them have quickly and flexibly adapted to the new requirements by taking advantage of their potentials, and thus made progress. Others--perhaps even their neighbors with similar natural conditions--are making no headway. That is, in their cases there are also subjective reasons concealed behind the lack of results.

Improving the operations and profitability of the approximately 300 operations with so-called unfavorable natural conditions also calls for urgent progress.

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Speaking of the tasks of the future, Jeno Vancsa emphasized: improving the level of domestic supply, which also takes into consideration the various demands, continues to be the prime task. The variety of agricultural production must be maintained to accomplish this. Export tasks are also significant, and continue to grow. Total exports must be increased this year by nine percent, and by about one-third in the next 5 years. Fulfillment of the grain and meat programs continues to be in the focal point of our plans.

The fact that the producers were successfully informed on time about the conditions and opportunities was great help in laying the foundations of production.

and to fulfill the plans. The agricultural wholesale purchase prices and the changes in subsidies were made public last year. The farms were able to prepare themselves in time for the planning by taking these into consideration.

The first 3 or 4 months of this year produced overall results according to the plan, or exceeding it. Wholesale purchases of slaughter livestock and, among other things, of milk were smooth in the first quarter; both of them even increased. The vegetable supply was well balanced. Export increased in the first three months of the year compared to the same period of last year.

There are now machinery and equipment valued at about 100 billion forints, in the possession of the large operations. We are pleased that they want to expand and increase this foundation; machinery sales have moved off dead center. Machinery valued at about 11 billion forints will be placed in the operations this year; the AGROTROSZT [Agricultural Supply Trust] sold 4 billion forints' worth of machinery and equipment during the first 4 months. The financial situation of the operations, and several central measures provided the foundations for this.

The expansion and use of international connections is very important for technical growth, just as in all areas of agricultural production.

Chemical fertilizer consumption continues to provide a reason for concern. The farms bought less chemical fertilizers than is absolutely necessary, and less than was planned. Withholding chemical fertilizers, nutrients is false economy which will definitely result in decreased yields. Chemical fertilizer is available [A total of] 1.5 million tons of active agents are available, and this is a significant opportunity to increase production even if the quality is at times unquestionably objectionable. But our production of plant protection chemicals is pleasingly on the rise: domestic industry is now producing a whole series of good quality products which earlier were available only from imports.

The very lively growth activity of large agricultural operations has great significance in laying further foundations for the Sixth Five-Year Plan. There is a significant amount of enterpreneurial desire. This year, for example, 1.6 billion forints will be spent on complex soil improvements, on amelioration, and within the frameworks of two large production systems, the IKR [Industry-type Corn Production System] and KITE [Corn and Industrial Crop Growing Cooperation (located at Nadudvar)] implementation of the intensive grain production program has begun on 100,000 hectares.

Overall, the modern types and the biological foundations necessary to expand production are available, but in this area again numerous unexploited opportunities exist. Last year, for example, 250 recognized plowland crop types were in general production; 70 percent of these are of domestic, the rest of foreign origin. The modern corn, sugar beet and oat types newly recognized this spring are also serving the improvement programs. The fact that in comparison with last year's 400 vegetable types this year 480 types are available to the large operations and to the small growers, also indicates significant progress. A similar statement can also be made about the biological foundations

of livestock raising: breeding animals are available in sufficient quantity and type to carry out the program.

In summary: the financial and technical conditions for production do exist, and the growth intentions of the operations surpass the credit and subsidy possibilities. In the final analysis this latter is a very good phenomenon indicating the desire to improve, even though in some cases it does cause problems. It is also useful that strong competition has developed among investors, and among the enterprises, by means of which the opportunity is there that really the best ideas will become implemented in investments, reconstructions, and completions.

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Agriculture is commonly known to be a large energy user. The branch's energy consumption dynamically increased until 1978. However, as a result of central measures taken in the interest of frugality, consumption decreased in the last 2 years by 6 percent, while production increased. The energy-efficient grain storage and soil tilling methods are becoming more and more popular--but still hide significant reserves--as a result of the energy program which is continuing to develop, and the work which has begun to make use of the waste energy which can be found in agriculture is also promising. But further results can be expected only if the operations will everywhere accept energy management as a comprehensive task, as an organic part of operating, and if they will implement it in this spirit.

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The tasks are significant and of high standards. On one hectare of agricultural area we are producing almost twice as much food as we did two decades ago. One agricultural worker produces food for 20 people. Our plan expects a further increase of performances by discovering and using our reserves, by vigorous improvements in profitability, and by coordinating the quantitative and qualitative requirements. Can this demand be fulfilled? With behavior which understands the requirements of our age, which goes out of its way to meet it, which takes initiatives, and by increasing our organizing strength, by renewed efforts: yes; this is how Jeno Vancsa summarized the message of his statement to the press.

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ECONOMIC DEVELOPMENT OF SOCIALIST COUNTRIES COMPARED

Bucharest REVISTA ECONOMICA in Romanian No 17, 24 Apr 81 pp 25-26

[Article by Nicolae Popov]

[Text] The evolution of world economy during the past year, in the context of the prolonged recession in the capitalist countries, of maintenance of the adverse effects of the oil and raw materials "crisis," of the slowed flows in terms of world exchanges of goods and services, of perpetuation of the arms race, of the constant rise in the foreign debt burden of developing countries, and other factors also impacted on the guidelines of economic policies in socialist countries, on the results obtained in achieving the goals planned. On an overall scale, the economic development of socialist countries during the past year has characteristics that are similar to those for 1979, focusing -- with a few changes in terms of emphasis -- on consolidation of the results obtained in the prior period, on projects targeted for achieving an optimal structural balance, on readjustment of the various proportions among the economic branches, for the purpose of ensuring a continuously harmonious and effective growth.

Hence, as indicated in Table 1, noticeable is a similarity of values attained in 1980 by different socialist countries for a number of basic indicators, such as national income, industrial output, and so forth, in the context of a certain slowdown of dynamics in economic development. Significant is the fact that, excepting the case of Poland (where the national income last year showed a reduction versus the level for 1979), in the other socialist countries the rises in the national income obtained in 1980 and those anticipated for this year prove the continuity in their economic development. The evolution of socialist countries appears all the more remarkable because in West-European capitalist countries for instance, after the year 1980, assessed by experts of the UN Economic Commission for Europe as very unfavorable, the increase forecast for 1981 ranges within the limits $\pm 1\%$, which practically is equal to economic stagnation. In this context the statistical data on Romanian economic development during the 1976-1980 period, respectively the annual average rise in the national income 7.2 percent, in total industrial output 4.8 percent, in the volume of foreign trade 16.5 percent, and so forth bears out -- again -- the dynamic nature of Romania's progress along the road to building the socialist society and the communist society.

Table 1. Dynamics of Some Indicators of Economic Development (in %)
(Rises + or Decreases - in 1980 Versus the Level for 1979)

Indicator	Bulgaria	Czechoslovakia	G.D.R. (German)	Hungary	Mongolia	Poland	Romania	Hungary	U.S.S.R.
National income									
Total industrial output									
Total agricultural output									
Volume of economic investments									
Labor productivity in industry									
Freight transportation volume									
Sales volume in socialist retail trade									
Foreign trade volume									
Per capita real income									
Dwellings built and made available to the people (thousand units)									

1. Social product in constant prices. 2. National income used for consumption and accumulation. 3. Marketable output. 4. In socialist agricultural enterprises. 5. In plant output. 6. Volume of construction-assembly work. 7. Investments in fixed assets and equipment. 8. Achieved versus planned level. 9. Investments in the socialized sector of the economy. 10. Social productivity of labor. 11. In railroad transportation. 12. Volume of exports (that of imports rose 2.12 in constant prices). 13. Idem (imports declined 10.8%). 14. Cash incomes of the population. 15. Net income per worker. 16. Real incomes of the population. 17. Millions sq m. 18. Including modernized dwellings.

Source: Reports of central statistical bodies in countries involved, on implementation of the 1980 plans for economic development; the 1981 plans for economic development of the countries involved.

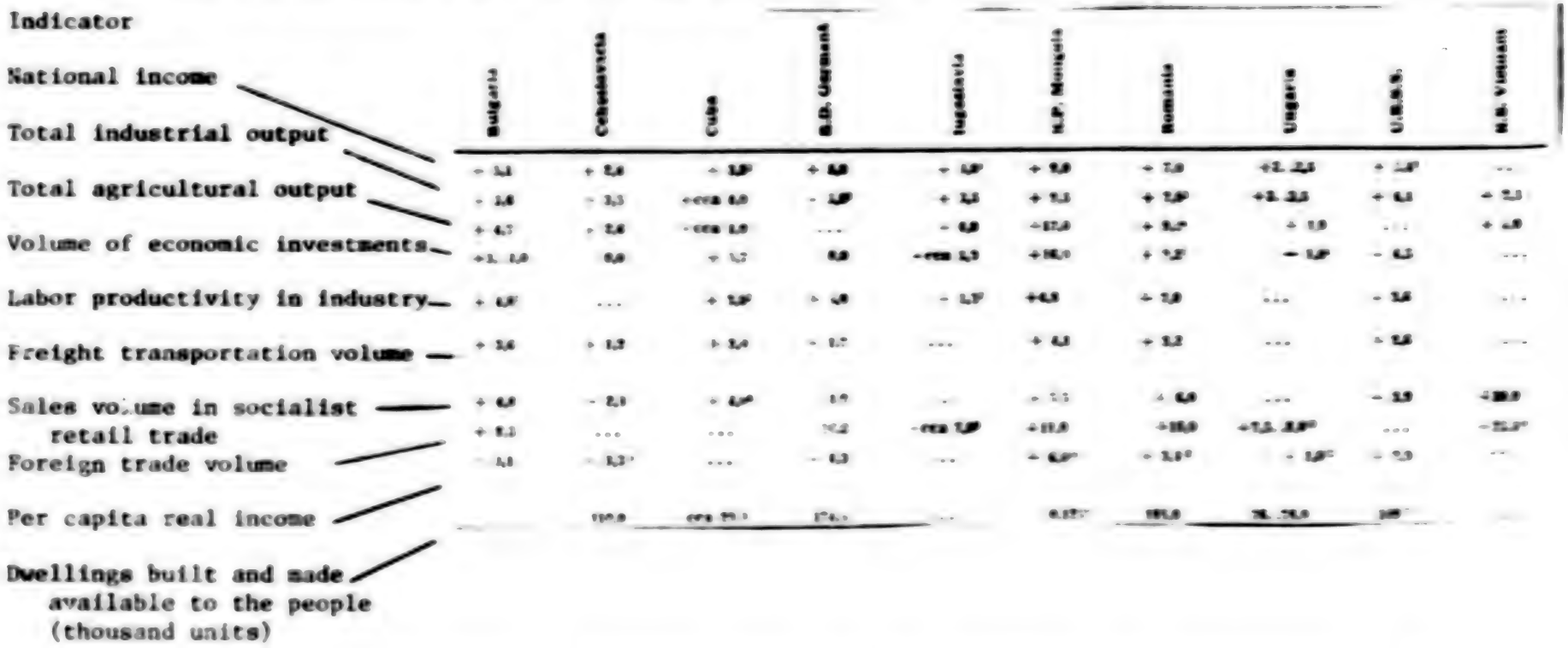
In terms of the growth of industrial production, the rises obtained in 1980 are close to or exceed the corresponding indices for the national income or the social product. Moreover, it is noticeable that in the socialist countries in which the achievements of industry last year were also expressed in the form of the indicator "net output," the level of this indicator, as a rule, was superior to the indicator "overall output" (in Romania's case these increases versus 1979 were 8.6% and 6.5%).

During the period under review the industrial development of the socialist countries, especially of the most advanced ones, was and continues to be keynoted by the basic principle of ensuring a balanced evolution of all the economy. The priority goals include: upgrading the relation between expansion of branches in Group A (industry making the means of production) and those in Group B (industry of consumer goods), between the development of the two basic economic branches -- industry and agriculture --, expansion of domestic bases of raw materials and energy carriers (for the purpose of minimizing the imports involved), giving precedence to branches and processes that use low amounts of raw materials, supplies and energy, with, concomitantly, attention paid to reducing the role of energy-intensive branches and processes, improving the quality of products and modernizing the output, and so forth.

In this context, the priority development of some branches that generate technological progress, appropriation of a growing portion of investment funds for modernization of existing production facilities ensure conditions for the continuous increase in the productivity of materialized labor and wiser utilization of material resources and labor. In Czechoslovakia -- versus the 3.2% rise in all the industrial output in 1980, as against the level for 1979 -- the output of the machine building industry went up 5.5% and that of the electrical engineering industry, 7.3%; in Bulgaria, the 5% rise in overall industrial output (1980) was accompanied by the 9.7 rise in the output of the chemical industry and 8.1% in the output of the electronics and electrical engineering industry; in Romania, -- because of the rapid increase in the output of the metallurgical, machine building and chemical industries -- the input of these industries into the overall industrial output went up from 50.4% in 1975 to 54.6% in 1980; and so forth.

In agriculture the evolution last year was more complex, with the underlying factors including the unfavorable climatic conditions, which generated absolute declines in overall output in a number of socialist countries (see Table 1). For the purpose of achieving the harmonious development of industry and agriculture, the stability of agricultural production, the conditions required for the smooth rise in the outputs obtained in both animal husbandry and crop growing, in this year and in the next years in many socialist lands (the Soviet Union, Romania, Yugoslavia, Hungary, Cuba, Vietnam, and others) provisions have been made for complex steps to solidify the technical-material basis of agriculture, to step up production, to make best use of local resources in this area. As far as Romania is concerned, under the prior five-year plan agricultural output rose, on an overall scale, at an average annual rate of almost 5%.

Table 2. Dynamics of Some Indicators of Economic Development (in %)
(Rises + or Decreases - Planned for 1981 Versus the Level Attained in 1980



1. Social product in constant prices. 2. National income used for consumption and accumulation. 3. Marketable output. 4. Net output. 5. Volume of fixed assets in the economy. 6. Investments in the socialist economic sector. 7. Social productivity of labor. 8. Volume of goods and services provided to the population. 9. Volume of exports (that of imports is expected to decrease 3%). 10. Volume of exports only. 11. Cash incomes of the population. 12. Total real incomes of the population. 13. Including modernized dwellings. 14. Million sq m.

Source: Same as in Table 1.

The implementation of the various renewing programs also required the mobilization and sensible use of the material, financial and human resources in the socialist countries. This requirement primarily translated into the reshaping of the policy of investments in the years 1980-1981, beginning with the absolute reduction of their volume in some countries (for instance in Poland or Yugoslavia), but chiefly focusing on their concentration and reorientation in most of the countries under review. For example, in Romania, the People's Republic of China, Czechoslovakia, the Soviet Union, Yugoslavia, Cuba, the Mongolian People's Republic, Vietnam and other countries, the aim is to minimize the number of investment projects, to concentrate the material and human resources in the sectors which are of greatest importance to the national economies, for the purpose of increasing the efficiency of construction-assembly, of the sensible utilization of the funds appropriated. In the case of less-developed socialist countries, noticeable is the marked orientation of investments toward creation and expansion of new subbranches in industry and agriculture.

Moreover, the aim is to promote the courses of intensive economic development of socialist countries. In Bulgaria, for instance, this trend is reflected in the fact that in 1980 almost all the rise in the national income came from greater labor productivity, in the Soviet Union in 1981 this source will provide 90% of the increase in industrial output, and in Romania -- where under the prior five-year plan greater labor productivity provided more than three-fourths of the rise in industrial output -- the same high rate (of 7%) of increase in labor productivity in industry also is anticipated for the year 1981. Another facet of stepped up economic activity is reflected in the fact that -- in the German Democratic Republic, for example -- the better utilization of material resources resulted in the 5% reduction of the relative consumption of raw materials, supplies and energy carriers, and this permitted the obtaining of a greater volume (by 5.5%) of industrial output in the context of the 1% decrease in the total consumption of primary energy.

In the end, we must point out that the concerns for modernizing the economy, for maximizing economic efficiency resulted, in many socialist countries (Romania, the Soviet Union, Hungary, the German Democratic Republic, Czechoslovakia, Bulgaria, the People's Republic of China, the Korean People's Democratic Republic) in formulation of systems for upgrading the management of the entire socioeconomic activity, and in some of these countries a new economic-financial system has already been applied in 1980-1981. Designed to ensure the furtherance of the scientific principles of management in all the economic echelons, the new economic-financial system is aimed at providing the leverages needed for the better and better utilization of all the existing resources.

The same as in other years, during the period under review -- in the context of the objective difficulties pointed out previously -- the problem of further consolidation and improvement of the people's standard of living, that of upgrading the people's working and living conditions have always been the focus of the socioeconomic policy of communist and workers' parties, of governments

in socialist countries. This constant concern is reflected not only in the continuous growth of working people's incomes, illustrated by the figures in tables 1 and 2 (with the remark that these are not strictly comparable). It also is illustrated in the yearly rise in the volume of commodity sales through the socialist retail trade network, and also in the volume of services offered to the population. Moreover, it is reflected in the ample activity of providing the people with new and more comfortable dwellings, a fact which results in the more rapid pace in renewing the housing supply in socialist countries, versus developed capitalist countries. Furthermore, we may here point out the greater and greater funds appropriated from the state budget and from profits achieved by socialist units, for sociocultural amenities, for better facilities in the areas of health, education and other activities. In this context the constant concern in Romania for better living conditions for working people is capsulized, for instance, in the increase -- in 1980, versus 1975 -- in the total real incomes of all the population in town and country by 34%, in the volume of commodity sales through the socialist retail trade network by 46.2%, in the state budget appropriations for sociocultural facilities by more than 39%, and so forth.

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ENERGY-EFFECTIVE AGRICULTURAL DEVELOPMENT SOUGHT

Bucharest REVISTA ECONOMICA in Romanian No 17, 24 Apr 81 pp 6-7,24

[Article by Oprea Parpala]

[Text] The modernization of Romanian agriculture -- by accomplishment of a new and profound agricultural revolution, whose major objectives involve the significant rise in output and labor productivity, the increase in economic efficiency and the upgrading of the overall level of civilization in the Romanian state -- is occurring in a context that is altogether different from the context in which the agriculture of the current economically developed countries was modernized, notably in the context of the world energy crisis, characterized by shortage and higher prices for fossil energy. This crisis also impacts on the economy.

Under the influence of models -- existing so far on a world scale -- for modernization of agriculture, the rise in the consumption of fuel (expressed in conventional crude) has run ahead of the increase in the total agricultural output. For example, in 1980 versus 1950, fuel consumption per hectare of complexly cultivated farmland accounted for 430%; but total agricultural output (in the context of the rise in current prices of expression) in 1979 accounted for 365% versus 1950. An overall picture of the efficiency of energy consumption (specifically fossil energy) in Romanian agricultural is provided by the following orientational figures: in 1977 versus 1950, the installed energy capacity for each 1000 lei of overall agricultural output was twice as great, and the consumption of conventional crude oil, 2.5 times greater [1].

Modern Agriculture -- Productive, Economical

It is clear that we cannot continue to modernize agriculture on the basis of a strategy that requires high energy consumption rates, as did during the respective periods -- taking advantage of the abundance and inexpensiveness of fossil energy -- countries with developed agriculture such as the United States, Great Britain, France and others. We no longer can afford the luxury of wasting no less than 16 calories synthesized by vegetable crops in order to obtain only 1 calorie on the consumer's table! It is necessary to rethink

the strategy for modernization of agriculture and seek new approaches, that are characteristic of this stage and of our social, political and natural-economic conditions, so that agriculture may be more productive but also more economical*.

The starting point for promoting such a strategy involves the very structure of production in agriculture, in whose optimalization one must take into consideration the rate of conversion of solar energy into potential energy and the rate of conversion of fossil energy into food energy.

It is known that almost all the Romanian territory occurs in a climatic zone which is propitious for the development of agriculture. The average of temperatures (of more than 10°C) and even the pluviometric conditions promote the development of the main crops that are characteristic of the temperate zone. Consequently, the focus must be on using a pattern of crops in which crops that involve a higher rate of solar energy conversion are prevalent. As against the average of about 1% of solar energy that is converted by plants into food energy, some plants have a far greater conversion capacity. Among the crops that are specific to our country, outstanding are those from the so-called Group C, that is those which convert 4% of the solar energy received, and prominent among them are corn (kernels) and soybean. This situation not only justifies the measures taken so far to expand these crops but also necessitates the further widening of the areas under these crops, especially if we take into consideration the fact that the corn-soybean binomial today involves the pivot of modern zootechnology, being capable of ensuring a balanced fodder basis in terms of proteins. In this context, it is our view that one could even take into consideration a certain reduction of the areas under wheat (up to the level required for meeting the needs of food consumption and state reserves) and consequent expansion of the other two crops. Moreover, in light of their greater capacity of utilizing solar energy, there is the need for an even greater concentration of these crops in the sunnier areas, with a larger annual amount of heat (over 10°C). This kind of changes in territorial distribution, specifically of the main crops in agriculture would also permit the more economical use of all the productive potential in the irrigated zones of Romania's southern part, resulting in a significant rise in the average per hectare yield only based on reduction of areas under extraearly hybrids in hilly and premontane zones.

Input of Research

A greater input into resolving this problem is expected from agricultural research which, proceeding from world achievements so far, is in duty bound to evolve soybean and corn strains and hybrids characterized by greater capacity of solar energy conversion. It is not fortuitous that in U.S. agricultural research these two crops are central matters, with investigations covering a very broad range of procedures -- beginning with simple improvements in the agrotechnical field up to genetic transformations, genetical engineering "producing" a new type of plant, with a new layout of the foliar system, so that the plant, this "live factory," may provide a higher yield in using the most inexpensive and inexhaustible energy of mankind -- solar energy.

Closely related to this is the efficiency of the consumption of energy (active and passive) for the chief agricultural crops of Romania. Studies conducted so far (which, however, do not specifically focus on the efficiency of fossil energy consumption) conclude that, by and large, the energy relation (between the energy used and the energy obtained for the hectare cultivated) is 1:6 up to 1:7. Although the differences are not too great, this time again the capital need involves the soybean crop (relation 1:7.1) and also the corn crop (relation 1:6.7). A special mention goes to barley, whose energy relation exceeds that of corn (1:6.8), but mainly based on economizing human energy, a fact which has turned it into a competitive crop in solidifying the fodder basis, accounting for the clear tendency to expanding the areas under barley.

Coming back to the soybean crop, we recall that though the productive potential (in kWh per hectare) accounts for only about 60% of that of the corn crop, energy consumption is only 55% versus the one needed for the wheat crop. The agrotechnical improvement of this crop by measures that do not require added energy consumption (such as the distance to be farmed between rows, and so forth) may help to boost 50% the current energy potential, justifying its transformation into a major oil-bearing and fodder crop of this country.

As for corn, whose capacity for using solar energy is far greater than that of grain crops (even versus barley), the energy relation does not indicate great differences in comparison with wheat; an additional consumption of 726 kWh provides an added energy of 8313 kWh (relation 1:11.4) but versus barley crops, an additional energy consumption of 752 kWh provides an added energy of only 4250 kWh (relation 1:5.7).

However, at fault is not the crop, recognized all over the world for its energy vigor, but the growing system used, beginning with the productive capacity of the hybrid and ending with the conditions of harvesting, conveyance and storage, which turn it into a great user of energy, in the context of incomplete utilization of these increased energy consumption rates. Let us keep in mind that about 20% of the area under corn is irrigated, a fact which amply increases energy consumption rates, but without their being accompanied -- so far -- by a corresponding rise in production. Furthermore, the production capacity of the new hybrids has gone up specifically based on higher energy consumption rates, and the harvesting loss supplements the picture of these adverse factors.

Consequently, in this area also, research must play a decisive role, especially if we take into consideration the fact that hitherto the relation between energy consumption rates and the results obtained was not included among the parameters of research programs. Therefore, the increase in energy consumption ran ahead of the rise in the production potential of new hybrids, and this resulted in lower conversion rates. Hence, there is the need for developing new strains of hybrids, that will ensure better use of the production conditions, in order to minimize relative energy consumption.

A special issue involves horticultural crops, specifically vegetables, that are great users of energy. Romanian experience in agricultural production indicates that, in comparison with the hectare under grain, energy consumption is 2.5-4 times as great (depending on the crop) for the hectare under field vegetables and 8 times as great for hothouse vegetables (in 1977, per hectare consumption of conventional crude was 4.2 times greater for field vegetables and 9 times greater for hothouse vegetables versus the average for agriculture). However, this does not mean our reducing the areas under vegetables (just as it is not possible to cease growing millet because of sparrows). However, we must concentrate vegetable crops in the areas with maximum solar energy potential and with minimum risks in terms of climatic accidents, and also substitute liquid fuel and gas with other sources of thermal energy (residual heat, thermal waters, and so on).

Upgrading the structure of production poses very complex and contradictory problems in animal husbandry. The energy relation (about 1:4) is favorable for raising hogs and fowls, and this also largely accounts for the expansion of this farming sector on an industrial scale. This resulted in deliberately neglecting the growth of the productive potential of the almost 4.5 million hectares of natural meadows and pastureland (usable only for raising cattle and sheep), because for 1 kg of beef or lamb, (fodder) energy consumption is 2/3 up to 3/4 greater. But we must take into consideration that the cheapest fodder in the whole world is the natural pasture, and this also accounts for the role of raising animals for meat in countries with developed agriculture. Moreover, whereas raising of hogs and fowls requires feed that competes with human food (grain), raising of cattle and sheep makes use of fodder resources that cannot find another effective productive utilization. Hence, we consider that the zootechnological production pattern must be upgraded by the faster expansion of cattle and sheep raising (for meat) while meeting two requirements: raising (at minimal cost) the production potential of natural pastures and meadows and stepping up research in the area of animal feed, for the purpose of increasing the fodder conversion rate in cattle and sheep farming.

Reserves for Cutting Energy Consumption

The reserves for reducing relative energy consumption rates are even greater if the upgrading of the production pattern is coupled with the reduction of energy consumption rates at all the levels of technological progress in modern agriculture.

In the context of the tractor remaining the chief energy source (at least in crop production), the reduction of energy consumption rates involved in its utilization becomes of absolute importance. We shall briefly list the main aspects of the problem: reduction of weight per HP, reduction of fuel consumption per HP, selection of the optimal type and power of the tractor under our conditions (the 65 HP universal wheeled tractor, supplemented with smaller power tractors -- 45 HP, -- or greater power tractors -- 80, 105 HP for various crops and conditions of operation), universalization of the types of tractors and farming machines, priority of the operation speed in comparison with the operation width, upgrading of the machinery system through

selection of the machines that use less energy (for instance, the option between the combine and the cob picker, in the case of corn), utilization of the fleet of tractors and agricultural machines in complex units, that perform several operations in one run -- and as a final point of new technologies, performance of a minimum of farm operations, where deep plowing is no longer done annually (in spite of all the contradictory views in this area).

But in modern agriculture, the chief element of fossil energy consumption tends to involve the utilization of chemical fertilizer and pesticides. Among chemical fertilizers nitrogen nutrients are those that use most energy (in order to obtain 1 kg nitrogen fertilizer 2 equivalent kg of oil are required). This fact is of outstanding importance to our agriculture, where nitrogen fertilizer is the chief nutrient required by the soils. Of course, in this area also there still are great reserves for raising economic efficiency, by judicious application of fertilizers in light of the needs of the soil and crop and by reduction of loss -- which still is great -- in transportation, storage and application. But in the current context attainment of the agricultural chemicalization parameters of developed countries -- specifically of West Europe -- seems impossible. However, agriculture has -- mainly on a long-range basis -- great potentialities for promoting the positive effect of chemical fertilizer. From this arsenal we list full use of the output of manure (whose nutritive substance contents are almost equal to those of chemical fertilizer applied in this country), utilization of green fertilizer (in double crop) and, specifically, expansion of areas under legumes (seeds), which are fixing agents of nitrogen from the atmosphere. But again scientific research has the decisive say, through genetic engineering, to provide all grain crops with this outstanding feature -- a fact that would result in about 2/3 of the country's arable area being annually fertilized with nitrogen fertilizer, without additional energy consumption. Furthermore, expanded use of biological procedures for crop protection and reduction of pesticide use to the minimum necessary level would result not only in curtailing the danger of polluting soils and farm products but also in achieving significant energy savings.

Major reserves for minimizing energy consumption exist in the areas of irrigation, construction and use of sheds for animals, without mentioning those in the areas of storage, transportation and processing of farm products.

Moreover, agriculture is increasingly asserting itself as a resource of local and renewable energy, which can provide it with a specific autonomy versus conventional, fossil resources. These local resources may be used in work processes, both mobile ones, in whose area there is the need for a reappraisal of the role of draft animals (primarily of the horse), and stationary ones (utilization of a part of the secondary output, catchment of eolian or hydraulic energy -- especially by smaller capacity and low-cost installations, that would serve small rural communities).

Hence, even in the context of the world energy crisis, there are sufficient elements whose creative utilization in conformance with our national characteristics, cause us to confidently view the future of modernization of Romanian agriculture.

FOOTNOTES

* The topics discussed in this article were also dealt with by the author in the report to the Symposium "Conservation of Energy and International Cooperation," 24-26 March 1981, Bucharest.

1. Ion Ceausescu et al: "Saving Energy and Fuel," REVISTA ECONOMICA, No 7/1978.

2. R. Tanasescu et al: "Energy Problems in Growing Field Crops," GRAIN AND INDUSTRIAL CROPS, No 7/1979.

11710
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GREATER USE OF RECYCLABLE ENERGY RESOURCES STUDIED

Bucharest REVISTA ECONOMICA in Romanian No 17, 24 Apr 81 pp 10-11

[Article by Stefan Ragalie, Institute of Industrial Economy]

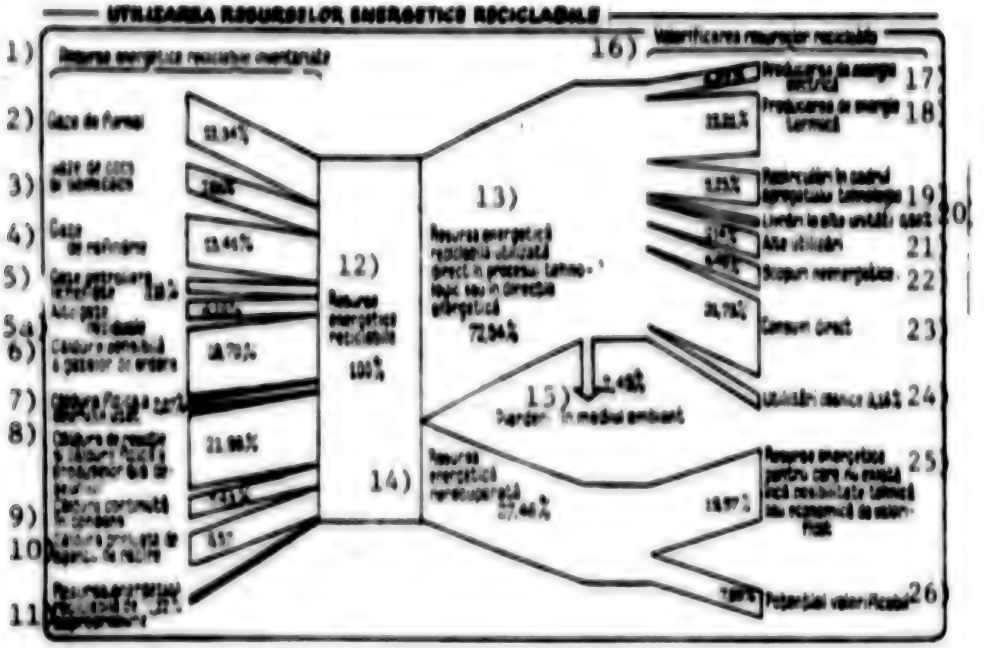
[Text] In the context in which the problems of saving energy have on a world scale assumed unprecedented magnitude, becoming major concerns of economic policy, the overall expansion of the country's energy basis is an essential requirement for the normal progress of economic growth. In their context, the avenues which become more and more important in achieving this goal involve the projects for integrating recyclable energy resources into the economic flow and the constant utilization of these resources in the economic processes. [1] This utilization may nowadays follow two main directions, notably: technological and energy-effective. [2]

Recycling Concerns From Designing Stage

The inventoried recyclable energy resources in our country at the level of the year 1980 accounted for about 12.1 mil. tcf , out of which only 72.5% was utilized in economic processes (chart). Out of all inventoried resources, more than half is used especially in the enterprise, for the production of steam, hot or warm water, for recirculation in technical installations or for other purposes. When analyzing individually each category of inventoried resource and the procedure for best utilization, one may note that in 1980 the heat of the roast gases, which accounts for 18.7% of the total potential inventoried, was the least utilized factor, especially because of the accompanying contents of dust and corrosive agents and the lack of potential users in the area where best utilization of this energy potential could be ensured.

In comparison with combustible recyclable resources, the utilization of thermal resources proceeds under tougher conditions also because of their diversity and reduced transportability, greater complexity of recovery processes and equipment, lack of experience in production and operation of such complex installations, and so forth.

Utilization of Recyclable Energy Resources



Key:

1. Inventoried recyclable energy resources
2. Top gas
3. Coke and semicoke gas
4. Refinery gas
5. Liquefied oil gas
5a. Other residual gases
6. Sensitive heat of roast gas
7. Physical heat of used gas
8. Reaction heat and physical heat of products and wastes
9. Heat contained in condensate
10. Heat taken over by cooling agents
11. Recyclable energy resource of 132% superpressure
12. Recyclable energy resources
13. Recyclable energy resource used directly in the technological process or the energy-effective area
14. Unrecovered energy resource
15. Loss in environment
16. Utilization of recyclable resources
17. Production of electrical energy
18. Production of thermal energy
19. Recirculation within the technical unit
20. Deliveries to other units
21. Other uses
22. Non-energy-effective purposes

23. Direct consumption
24. Household uses
25. Energy resources for which there are not yet technical or economic prospects for utilization.
26. Utilizable potential

A study of the procedure for utilizing recyclable energy resources in 1980 indicates that the prospects for use have not been fully developed; about 3 mil. tcf -- in the key energy-intensive branches -- continue to discharge in the atmosphere. Although each industrial branch has its own problems and characteristics, everywhere there are potentialities -- practically with an overall applicability -- for improving the energy yields, in the current installations, by fuller and more complex use of the available recyclable energy resources. In this context we state that, regardless of the specific nature of production, the economic units must make significantly greater efforts with the focus on:

a. Concentration of electrical and thermal energy production in industrial and urban steam power plants and as much as possible location of the new heat users in proximity of the electric power station;

b. Recovery of the heat of roast gas for preheating the boiler water, the combustion air, the fuel or for charge preheating (in the case of industrial furnaces);

c. Supply of operation fluids (water, air, and so on) and electric and thermal energy, at the levels strictly required by industrial users;

d. Recovery of recyclable residual gases and heat lost in the environment in all industrial facilities and their use for water heating or other practical purposes;

e. Utilization of recyclable energy resources, possibly in combination with solar energy for drying agricultural products and ceramic materials;

f. Upgrading the thermal insulations and expanding the use of heat pumps;

g. Ensuring continuous operation of the equipment for measurement, control and adjustment, in all industrial facilities.

In light of the important fuel savings that can be achieved through recovery of recyclable energy resources it is extremely significant to conduct the evidence, survey and resolution of the problems regarding the effective use of fuel resources in the category mentioned above as early as in the stage of development of the technical documentation of the technological and production approaches proposed. This will result in better avoiding the obstacles that sometimes arise on the path of complex and efficient recycling of energy resources.

Micro-Macroeconomic Coordination in Energy Recovery Efficiency

A basic component of the program for utilization of recyclable energy resources involves the need for development in the context of great efficiency. In examining this facet of the problem at both macroeconomic and microeconomic level, we must state that there is a discrepancy in expressing the levels of economic efficiency. It involves the fact that an investment made for the purpose of utilizing a recyclable energy resource may appear as inefficient at the microeconomic level (at the enterprise level), specifically because the increase in expenses needed for this purpose may adversely affect the indicators of economic and energy efficiency planned. This may be so especially because in determining the level of the indicators no account is taken of the size of the supplemental costs required for saving energy, although energy recovery evidently is necessary and effective in the context of the national economy. That is why we maintain that in order to express the actual efficiency of the program for utilization of recyclable energy resources we must focus on the limited nature of the principal nonregenerable energy resource (oil -- considered as marginal fuel), a fact that necessitates relating any saving of energy from users to the equivalent saving of oil which the national economy achieves in this manner. We stress this idea because it is evident that the actual size of the savings of energy resources achieved by recycling is reflected not only in the enterprise that achieves it at a particular price of energy clearing but also indirectly, at the macroeconomic level, as a potential expense which could be avoided, to the effect that we no longer import a corresponding quantity of oil at an average price of 2950 lei tcf.

In order to avoid the above-mentioned discrepancy in the context of the steps taken to increase the profitability of the extractive and processing branches, in our view, it is necessary to work out new technical regulations that would upgrade correspondingly the current regulations (namely provision E 41-66). The new regulations must ensure a more fertile framework for implementing the measures for utilization of thermal and fuel energy resources in light of the real complex efficiency of the recovery process. In this context we feel that it is relevant to make the following suggestions:

a. The projects for utilization of recyclable energy resources should be financed in the future from a centralized fund, and the efficiency of the investment should be monitored by a specialized economic unit; its assessment should be made at the same level, notably at the level of the national economy. [3]

b. In case the financing of the projects for utilization of recyclable energy resources will continue to be made by the unit in which the recyclable resource was generated, by direct participation of the units benefitting in achieving it, we feel that in calculating the efficiency levels we should take as the equivalent value the value of 2880 lei per ton of conventional fuel.

c. In updating and future sizing of the production efficiency indicators in enterprises greater emphasis should be placed on additional expenses (investments and costs) involved in energy saving by utilization of

recyclable resources, in light of the major interest in increasing the energy efficiency in the entire economy.

We assess that such measures are part of the system of specific projects conducted in recent years in Romania for the continuous rise in economic and energy efficiency by full utilization of energy resources and for recovery of the greatest possible value of primary resources as a result of better use of fuel and energy and that through fuller use of the available recyclable energy resources they will help to appreciably expand the country's energy base.

FOOTNOTES

1. By its area of operation, the recyclable energy resource is identified with the content of the notion of secondary energy resource (used in specialized literature in socialist countries) or residual resource (in American and West-European specialized literature).

2. In the technological direction the recyclable energy resource is used for the purpose of improving the efficiency of the process in which it was generated, respectively for raising the energy yield of the facility, or as technological fuel in the process. During utilization in the energy direction the potential of the recyclable energy resource is given to another user that by utilizing it decreases its consumption of primary energy.

3. This kind of utilization is now promoted in France, the United States and England.

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